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ABSTRACT

This fact sheet provides a basic overview of energy problems and programs in the United States and discusses the role that vocational education can play in solving those problems. The National Energy Plan is described including its objectives, strategies, and seven legislative acts: (1) The National Energy Conservation Act; (2) The Power Plant and Industrial Fuel Use Act (Coal Conversion Act); (3) The Public Utilities Regulatory Policies Act; (4) The Natural Gas Policy Act; (5) The Energy Tax Act; (6) Crude Oil Windfall Profits Tax Act of 1980; and (7) Energy Security Act (Synthetic Fuel Act). Ways in which vocational education programs in some states are responding to the energy dilemma are reviewed. The employment outlook is described for four key alternative energy areas: solar, coal, energy efficiency (conservation), and nuclear. A bibliography citing six references and 14 additional resources, most of which are available from the Educational Resources Information Center (ERIC) system, is provided. (DC)

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Energy.

OVERVIEW: ERIC Fact Sheet No. 6.

by

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ERIC OVERVIEW

FACT SHEET No. 6

Clearinghouse on Adult, Career, and Vocational Education

ENERGY

This Fact Sheet gives a basic *overview of energy and vocational education.* It is designed to help increase your understanding of the energy dilemma, and the role vocational education must play in solving the problem. In addition to this basic information, resources, principally from the Educational Resources Information Center (ERIC) system, have been listed. These resources provide more complete information, which can help you plan and implement energy-related vocational education programs.

WHAT IS THE NATIONAL ENERGY PLAN?

The first National Energy Plan was signed into law in October 1978. This plan became known as the National Energy Act and originally consisted of five separate laws. In 1979, two additional laws were passed to complete the plan. The National Energy Plan has the following principal objectives:

- Immediate objective: To reduce dependence on foreign oil and to reduce vulnerability to supply interruption
- Mid-term objective: To keep United States oil imports low in preparation for the period when world oil production approaches its capacity
- Long-term objective: To develop renewable and inexhaustible energy sources to sustain long-run economic growth

The basic underlying strategies outlined to smooth the impact of inevitable changes in energy supply and use include the following:

- Conservation and fuel efficiency to reduce growth of demand for energy
- Rational pricing of energy resources to allow domestic prices to reflect the higher world prices
- Conversion from oil and gas use to coal and other conventional fuel sources
- Development of solar and other unconventional fuel sources

WHAT LEGISLATION IS INFLUENCING THE ENERGY DILEMMA?

To implement its primary purpose, the National Energy Plan included the following seven pieces of legislation:

- *The National Energy Conservation Act* – To provide for regulation of interstate commerce so as to reduce the growth of demand for energy through (a) energy conservation and (b) development of solar and other alternate energy sources
- *The Power Plant and Industrial Fuel Use Act* (known also as the Coal Conversion Act) – To promote the use of fuels other than oil and natural gas in the production of energy in new and existing electric power plants and other major fuel-burning installations
- *The Public Utilities Regulatory Policies Act* – To alter price and other regulations on public utilities in such a way as to encourage conservation and efficient use of electricity and to improve wholesale distribution of electric power, while maintaining equity in the rate structure
- *The Natural Gas Policy Act* – To eliminate the distortions caused by two-tiered (interstate/intrastate) pricing of natural gas and to remove "outmoded regulatory burdens" associated with sales in interstate markets
- *The Energy Tax Act* – To provide incentives consistent with the purpose of (a) The National Energy Conservation Act and (b) The Coal Conversion Act
- *Crude Oil Windfall Profits Tax Act of 1980* – To impose windfall profits tax on domestic crude oil; to increase the time allowed for and amounts of conservation and renewable tax credit incentives; and to relieve economic burdens on low-income families produced by escalation of energy prices
- *Energy Security Act* (known also as the Synthetic Fuel Act) – To achieve energy security by encouraging, fostering, and subsidizing production of synthetic fuel from domestic resources; to reduce dependence on imported oil and gas through the development of biomass and alcohol energy; to encourage use of renewable energy resources; to encourage energy conservation and use of solar energy; to encourage use of geothermal energy; and other purposes

HOW IS VOCATIONAL EDUCATION RESPONDING TO THE ENERGY DILEMMA?

For the most part, vocational education has been slow in responding to the energy dilemma. Much of this delay can

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be attributed to the uncertainties that accompany the current energy situation and the lack of accurate information on job creation and curriculum development needs. In many areas related to energy, the technology and development remain in the experimental stages. Also, many energy-related jobs are locally or regionally oriented, which compounds the problems associated with utilizing national projections for energy-related employment.

A recent study by the American Vocational Association (1980) categorized the types of energy-related problems being funded by states as pilot or demonstration projects as follows:

- Thirty-four have solar energy programs.
- Twenty-five have programs to train for the insulating or retrofitting of homes.
- Nineteen have conservation programs.
- Seventeen have power mechanics programs.
- Fifteen have oil and gas technology programs.
- Fifteen have coal technology programs.

At the federal level, the current vocational education legislation (P.L. 94-482) has made funding available for a variety of program improvement activities, including energy-related programs.

Administered at the state level, over $60 million has been obligated nationwide in the past three years for research (both innovative and exemplary), and curriculum development projects. A summary of those projects is now available (Arthur and Budke 1980 a and b), and it reveals that several projects have focused on energy-related vocational education.

For example, two curriculum development projects funded in Minnesota focused on adult vocational education in energy. The first, conducted by a local school district, was designed to provide better technical information and improved sensitivity among school personnel toward energy conservation and to train local building maintenance personnel in conducting energy audits. The existing adult energy education course curriculum was revised, put into modular format, and pilot tested; a modular curriculum model was developed; and a mini-course to train building maintenance personnel was developed.

WHAT ARE THE POTENTIAL TRAINING NEEDS FOR THE ALTERNATIVE ENERGY AREAS?

As the traditional supplies of energy decrease, exploration of alternative energy possibilities will continue to increase. Increased use of alternative energy sources such as solar, wind, and nuclear will lead to an increased demand for individuals with specific training in new and changing energy occupational areas. However, reliable growth projections for energy-related occupations are difficult to obtain. Projections tend to vary depending upon whether one is pro-coal, pro-nuclear, or pro-solar. What follows is a brief overview of the employment outlook in four key alternative energy areas: solar, coal, conservation, and nuclear.

Solar

Solar energy has been one of the more popular alternative energy areas. Maidique (1979) believes "that given reasonable incentives, solar could provide between a fifth and a quarter of the nation's energy requirements by the turn of the century." Predictions of the labor force needed to staff solar-related industries vary widely, ranging from 25,000 to 80,000 workers nationwide by 1985. Whatever the actual figure may be:

> Major solar jobs related to heating and cooling and solar systems can be subdivided into (1) collector manufacturing jobs, (2) component manufacturing jobs, (3) installation jobs, (4) distribution jobs, and (5) indirect/induced jobs. Those jobs of the most direct concern to vocational education are the installation-related jobs. Installation jobs are those that occur on-site, as a given solar system is placed onto or into a residential or industrial structure. (Forgionne and Kopp 1979)

Between now and 1990, the most immediate jobs in installation will be those involving the following:

> (1) fitting existing residences with solar water heating, (2) equipping new residential construction with solar space and water heating, (3) retrofitting existing commercial space with solar space and water heating, (4) using active solar systems for retrofit and new process heat and other industrial applications. (California Public Policy Center 1978, p. 51)

Coal

The National Energy Plan calls for conversions from oil and gas use to coal and other conventional fuel sources. Increased production and productivity of these sources will be accomplished through changing technology, increasing individual miner productivity, and hiring additional miners. According to projections, 40,000 to 45,000 new hires per year will be needed to meet a demand for 3 million miners in 1985. However, the employment opportunities will be localized; that is, employment will be concentrated in certain geographical regions and will be focused on the individual mines. The coal industry areas in which educational institutions can fill needs are—

- providing entry-level training and short-course upgrading training;
- providing annual safety and health training and certification preparation;
- providing training for maintenance of equipment.

Energy Efficiency (Conservation)

While it is widely recognized that energy conservation should be a part of all vocational programs, there has been disagreement over the possibilities for a new occupation in energy conservation. Up to this point, there has been little demand from industry for individuals trained as energy efficiency technicians.

The Far West Laboratory, in 1979, developed an energy conservation model comprised of four components that present a comprehensive approach to energy conservation and its relationship to postsecondary vocational education and adult education. The four components of the model

have been designed to answer a series of questions:

- Why does the educator need to know about energy conservation?
- What does the educator need to know or to consider to develop a comprehensive understanding of energy conservation?
- What learning materials and resources are useful in acquiring an understanding of energy conservation?
- What types of instruction and learning arrangements would be used to transmit an understanding of energy conservation to students?

Nuclear

Earlier projections of massive growth in the nuclear industry have been revised downward. Factors such as licensing procedures, costs, and other restrictions have increased the time between the planning and actual operation of a nuclear power plant to approximately ten years. In addition, attacks on the nuclear industry for failing to develop feasible, safe, and acceptable methods to dispose of waste material have been effective in slowing the development of nuclear generating facilities. These factors indicate that it is not likely that nuclear energy will require large numbers of new workers over the next ten years.

Training programs currently operating are postsecondary nuclear energy technician programs that have been initiated to meet the local demands of newly constructed power plants. Three key problems have arisen in the nuclear technician programs:

- Construction time increases for nuclear power plants have completely negated any past human resource planning.
- The training provided did not meet the needs of the utilities, namely, to have operators that could pass the Nuclear Regulatory Commission's licensing examination.
- Training as nuclear technician did not ensure a favorable job position over unskilled workers.

WHERE CAN YOU FIND FURTHER INFORMATION?

This Fact Sheet has provided a basic overview of energy and vocational education. The documents listed in the Bibliography and References sections will provide you with more comprehensive information on this subject. These materials may be found in the Education Resources Information Center (ERIC) collection by using the ED number indicated in the resource listing. Further, you can always find additional and related information from documents contained in the ERIC system under the following index terms (descriptors and identifiers). The terms most directly related to the subject are indicated in boldface.

Coal
Coal Gasification
Curriculum Design
Curriculum Development
Demand Occupations
Educational Needs
Emerging Occupations
Energy
Energy Conservation
Energy Crisis
Energy Education
Energy Occupations
Fuels
Job Analysis
Nuclear Energy
Retrofitting
Solar Radiation
Technical Education
Vocational Education

If you need further help in finding these materials, contact the User Services Coordinator, ERIC Clearinghouse on Adult, Career, and Vocational Education, The National Center for Research in Vocational Education, The Ohio State University, 1960 Kenny Road, Columbus, Ohio 43210; phone 800-848-4815 or 614-486-3655; cable CTVOCEDOSU/Columbus, Ohio.

Materials published by the National Center for Research in Vocational Education may be purchased from National Center Publications at the same address and phone numbers as those of the ERIC Clearinghouse.

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